Linyin Cheng, PhD

Contact Information
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Education

- ✧ Ph.D. **University of California, Irvine**
  Civil and Environmental Engineering (Hydroclimate), 2014
- ✧ M.S. **Clarkson University**
  Civil and Environmental Engineering (Hydrodynamic), 2011
- ✧ B.S. **Sichuan University**
  Civil Engineering (Hydraulic and Hydroelectric), 2009
- ✧ B.S. **Sichuan University**, Second Bachelor's degree in Law, 2009

Research Interests

- ✧ Hydrologic and Climatic Extremes
- ✧ (Conditional) Extreme Value Analysis
- ✧ Stationary and Non-stationary Processes
- ✧ Risk Analysis, Uncertainty Analysis
- ✧ Multivariate Analysis, (Vine) Copula
- ✧ Bayesian Modeling, Empirical Bayes
- ✧ Spatial and Temporal Stochastic Modeling
- ✧ Detection and Attribution

Research Experience

- ✧ Associate Research Scientist, **NOAA, ESRL/PSD** (10/2014 to present)
  - research focus: climate change impact assessment on water resources
  - research focus: assessing the individual and mutual effects of climate change and ENSO on climatic extremes
- ✧ Postdoctoral Scholar, **University of Colorado, Boulder, and NOAA/CIRES** (10/2014 – 10/2015)
  - research focus: develop frameworks for spatio-temporal extreme value analysis
- ✧ Advanced Study Program Graduate visitor, **NCAR** (6/2013 – 9/2013)
  - research focus: empirical Bayes estimation for the conditional extreme value model
  - research focus: develop the non-stationary extreme value analysis model (NEVA)
- ✧ Research Assistant, **University of California, Irvine** (9/2011 – 8/2014)
  - research focus: extreme value analysis in hydrology and climatology
  - Ph.D. dissertation: Frameworks for Univariate and Multivariate Non-stationary Analysis of Climatic Extremes
- ✧ Research Assistant, **Clarkson University** (8/2009 – 4/2011)
  - research focus: numerical modeling of river ice dynamics
  - M.S. thesis: A Numerical Study on the upper St. Lawrence River Ice Dynamics and the Need for the Ice Sluice Gates

Teaching Experience and Interests

- ✧ Teaching Assistant
  - Lectures in lab and discussion sessions, grade problem sets, papers and exams for Watershed Modeling course at UC-Irvine in 2013 and 2014 academic years
  - Lectures in lab and discussion sessions for Geographic Information System course at UC-Irvine in 2014 academic year
- ✧ Co-instructors
  - Guest lectures on multivariate extreme value analysis at CU-Boulder in 2015 academic year http://civil.colorado.edu/%7Ebalajir/CVEN6833/lectures/Linyin-Copula-lecture-Dec8.pdf
  - Guest lectures on extreme value analysis in Climate Data Analysis course at UC-Irvine in 2014 academic year
- ✧ Organizing Committee
  - Copulas for Hydrology and Climate Applications Workshop, UC-Irvine, 2014
- ✧ Peer Mentors
  - Mentor fellow graduate students at UC-Irvine in 2012 and 2013 academic years

Membership and Reviewer

- ✧ Member of American Geophysical Union (AGU)
- ✧ Reviewer for:
  Journal of Climate; ***Climate Research***; ***Journal of Geophysical Research: Atmospheres***; ***Theoretical and Applied Climatology***; ***International Journal of Climatology***; ***Climate***; ***Scientific Reports***; ***Natural Hazards and Earth System Sciences***; ***Journal of Hydrology***; ***Journal of Hydrologic Engineering***; ***Extremes;***
  Risk Analysis; Environmental Modelling and Software; Advances in Statistical Climatology, Meteorology and Oceanography

Fellowship, Honors and Awards

- ✧ **AGU's Natural Hazards Focus Group Award for Graduate Research 2015**
- ✧ Received the **Cooperative Institute for Research in Environmental Sciences (CIRES) Fellowship** in Postdoctoral Program from 10/2014 – 10/2015
- ✧ Competitively selected for the **Advanced Study Program (ASP) Fellowship** in Postdoctoral Program at the National Center for Atmospheric Research (NCAR) in 2014
- ✧ **AGU's Outstanding Student Paper Awards (OSPAs) in Hydrology section,** for the AGU Fall meeting, 2013 poster "Non-stationary Extreme Value Analysis in a Changing Climate: A Software Package"
- ✧ Received the **Advanced Study Program** support to participate in the Graduate Visitor Program at the National Center for Atmospheric Research (NCAR) from 6/2013 – 9/2013
- ✧ **Teaching Assistantship** and **Graduate Research Scholarship** for Ph.D. research at UC-Irvine 2011 – 2014

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Scientific and Educational Software
Non-stationary Extreme Value Analysis (NEVA) Toolbox
By **Linyin Cheng** and Amir AghaKouchak
URL:http://www.mathworks.com/matlabcentral/fileexchange/48238-nonstationary-extreme-value-analysis--neva--toolbox

Publications

1. **Cheng, L.**, AghaKouchak, A., Gilleland, E., Katz, R., 2014, Non-stationary Extreme Value Analysis in a Changing Climate, *Climatic Change*, 127, 353-369, doi: 10.1007/s10584-014-1254-5.
   NEVA Toolbox
   URL:http://www.mathworks.com/matlabcentral/fileexchange/48238-nonstationary-extreme-value-analysis--neva--toolbox

2. **Cheng, L.**, AghaKouchak, A., 2014, Nonstationary Precipitation Intensity-Duration-Frequency Curves for Infrastructure Design in a Changing Climate, *Scientific Reports*, 4, 7093, doi: 10.1038/srep07093.

3. **Cheng, L.**, Gilleland, E., Heaton, M., AghaKouchak, A., 2014, Empirical Bayes Estimation for the Conditional Extreme Value Model, *Stat*, 3, 391-406, doi: 10.1002/sta4.71.

4. AghaKouchak, A., **Cheng, L.**, Mazdiyasni, O., Farahmand, A., 2014, Global Warming and Changes in Risk of Concurrent Climate Extremes: Insights from the 2014 California Drought, *Geophysical Research Letters*, 41, 8847-8852, doi: 10.1002/2014GL062308. (on Research Spotlights of EOS)

5. **Cheng, L.**, AghaKouchak, A., 2015, A Methodology for Deriving Ensemble Response from Multimodel Simulations, *Journal of Hydrology*, 522, 49-57, doi: 10.1016/j.jhydrol.2014.12.025.

6. **Cheng, L.**, Phillips, T., AghaKouchak, A., 2015, Non-stationary Return Levels of CMIP5 Multi-model Temperature Extremes, *Climate Dynamics*, 44, 2947-2963, doi: 10.1007/s00382-015-2625-y.

7. Nasrollahi, N., AghaKouchak, A., **Cheng, L.**, Damberg, L., Phillips, T., Miao, C., Hsu, K., and Sorooshian, S., 2015, How Well Do CMIP5 Climate Simulations Replicate Historical Trends and Patterns of Meteorological Droughts?, *Water Resources Research*, 51, 2847-2864, doi: 10.1002/2014WR016318.

8. **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Eischeid, J., 2016, How Has Human-Induced Climate Change Affected California Drought Risk?, *Journal of*

Climate, 29.1, 111-120, doi: 10.1175/JCLI-D-15-0260.1

9. Hoerling, M., Eischeid, J., Perlwitz, J., Quan, X., Wolter, K., **Cheng, L.**, 2016, Characterizing Recent Trends in U.S. Heavy Precipitation, *Journal of Climate*, 29, 2313-2332, doi: 10.1175/JCLI-D-15-0441.1

10. Hoell, A., Hoerling, M., Eischeid, J., Wolter, K., Dole, R., Perlwitz, J., Xu, T., **Cheng, L.**, 2016, Does El Niño Intensity Matter for California Precipitation?, *Geophysical Research Letters*, 43, 819-825, doi: 10.1002/2015GL067102

11. Madadgar, S., AghaKouchak, A., Shukla, S., Wood, A., **Cheng, L.**, Hsu, K., Svoboda, M., 2016, A Hybrid Statistical-Dynamical Framework for Meteorological Drought Prediction: Application to the Southwestern United States, *Water Resources Research*, 52, 5095-5110, doi: 10.1002/2015WR018547

12. Bracken, C., Rajagopalan, B., **Cheng, L.**, Kleiber, W., Gangopadhyay, S., 2016, Spatial Bayesian Hierarchical Modeling of Precipitation Extremes over a Large Domain, *Water Resources Research*, 52, 6643-6655, doi: 10.1002/2016WR018768

13. Wolter, K., Hoerling, M., Eischeid, J., **Cheng, L.**, 2016, What History Tells Us About 2015 US Daily Rainfall Extremes, *Bulletin of the American Meteorological Society (in press)*

Under Revision:

14. Song, X., Zhang, J., AghaKouchak, A., Xuan, Y., Kong, F., Zhan, C., Zhu, K., **Cheng, L.**, 2016, Assessing changes in precipitation extremes in the Beijing metropolitan area from 1960-2012: Spatio-temporal characteristics, possible causes, and implications, *Journal of Hydrology* (*under revision*)

Under Review:

15. **Cheng, L.**, Hoerling, M., Smith, L., Eischeid, J., 2016, Assessing the Individual and Mutual Effects of Climate Change and ENSO on Extreme Events, *Journal of Climate* (*under review*)

16. Ragno, E., AghaKouchak, A., Love, C., **Cheng, L.**, and Lima, C., 2016, Quantifying Climate Change Impacts on the Intensity-Duration-Frequency of Extreme Precipitation across the United States, *Nature Climate Change* (*under review*)

In Preparation:

17. **Cheng, L.**, Hao, Z., Thorstensen, A., Rajagopalan, B., 2016, A Bayesian Framework for Assessing Contributions of Underlying Factors to Compound Events via Vine Copula

18. **Cheng, L.**, Rajagopalan, B., AghaKouchak, A., Bracken, C., 2016, A Non-stationary Spatio-temporal Framework for Climate Informed Extreme Precipitation Analysis

19. Yang, P., **Cheng, L.**, Ng, T., 2016, Quantifying Uncertainty of Return Periods for Multiple Extremes: A Comparison between Bootstrapping and Markov Chain Monte Carlo

20. Perlwitz, J., Xu, T., **Cheng, L.**, Hoerling, M., Wolter, K., Barsugli, J., 2016, Linking Extreme Weather Events and Extreme ENSO States

Technical Reports

1. Skahill, B., AghaKouchak, A., **Cheng, L.**, Byrd, A., Kanney, J., Bayesian Inference of Nonstationary Precipitation Intensity-Duration-Frequency Curves for Infrastructure Design, 2016, US Army Corps of Engineers ERDC/CHL, CHETN-X-2

2. **Cheng, L.**, Huang, F., Knack I., and Shen, H., 2011, A Study on the Need of Ice Sluice Gates for St. Lawrence/FDR Power Project, Report to New York Power Authority

Selected Conference Papers, Presentations and Posters

- ✧ Bracken, C., Rajagopalan, B., **Cheng, L.**, Gangopadhyay, S., Efficient Bayesian Hierarchical Modeling of Spatial Precipitation Extremes, Proceedings of the Fifth International Workshop on Climate Informatics: CI 2015. J. G. Dy, J. Emile-Geay, V. Lakshmanan, Y. Liu (Eds.). September 2015. ISBN: 978-0-9973548-0-5
- ✧ **Cheng, L.**, Hoerling, M., Smith, L., Eischeid, J., Assessing the Individual and Mutual Effects of Climate Change and ENSO on Extreme Events, CIRES Review, August 29-31, 2016, NOAA, Boulder, CO, USA
- ✧ Yang, P., **Cheng, L.**, Ng, T., 2016, Quantifying Uncertainty of Return Periods for Multiple Extremes: A Comparison between Bootstrapping and Markov Chain Monte Carlo, AOGS 13th Conference, 31st July to 5th Aug, 2016, Beijing, China
- ✧ Hoerling, M., **Cheng, L.**, Smith, L., Eischeid, J., Some Lessons in Event Attribution: The Texas/Oklahoma Rains of May 2015, The International Detection and Attribution Group (IDAG), February 1-3, 2016, NCAR, Boulder, CO, USA
- ✧ **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Eischeid, J., How Has Human-induced Climate Change Affected California Drought Risk?, AGU Fall Meeting, December 14-18, 2015, San Francisco, California, USA.
- ✧ Bracken, C., Rajagopalan, B., **Cheng, L.**, Gangopadhyay, S., Coupled Bayesian Hierarchical Modeling of Streamflow and Precipitation Extremes, AGU Fall Meeting, December 14-18, 2015, San Francisco, California, USA.
- ✧ Madadgar, S., **Cheng, L.**, Wood, A., Svoboda, M., AghaKouchak, A., A Hybrid Framework for Improving NMME Precipitation Forecasts, AGU Fall Meeting, December 14-18, 2015, San Francisco, California, USA.
- ✧ Ragno., E., **Cheng, L.**, Cui, X., AghaKouchak, A., Nonstationarity in Extremes and Changes in Flood Risk in a Warming Climate, International Conference on Advances in

Extreme Value Analysis and Application to Natural Hazards, Sep. 16-18, 2015, Santander, Spain

- ✧ **Cheng, L.**, Current Effects of Human-induced Climate Change on California Drought, ESRL Physical Sciences Division Review 2015, May 12-14, 2015, NOAA, Boulder, CO, USA
- ✧ **Cheng, L.**, Spatio-temporal Frameworks of Extreme Value Analysis: Applications to Understanding and Modeling the Current California Drought and Rainfall Extremes, April 29th, 2015, University of Colorado, Boulder, Boulder, CO, USA
- ✧ **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Multivariate Assessment on the Role of Climate Change in California Drought, AGU Chapman Conference, April 20-22, 2015, University of California, Irvine, Irvine, CA, USA
- ✧ Mazdiyasni, O., AghaKouchak, A., **Cheng, L.**, Farahmand, A., Multivariate Hot-Drought Risk Assessment: The 2014 California Drought, AGU Chapman Conference, April 20-22, 2015, University of California, Irvine, Irvine, CA, USA
- ✧ **Cheng, L.**, Rajagopalan, B., AghaKouchak, A., Bracken, C., A Generalized Spatio-temporal Framework for Climate Informed Extreme Precipitation Analysis, Hydrology Days, March 23-25, 2015, Colorado States University, Fort Collins, CO, USA
- ✧ **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Extreme Value Theory and the California Drought: Multivariate Assessment on the Role of Climate Change in California Drought, The International Detection and Attribution Group (IDAG), January 21-23, 2015, NCAR, Boulder, CO, USA
- ✧ **Cheng, L.**, AghaKouchak, A., An Empirical Bayes Framework for Assessing Changes in the Hydrological Cycle, AGU Fall Meeting, December 15-19, 2014, San Francisco, CA, USA
- ✧ Luke, A., Schubert, J., **Cheng, L.**, AghaKouchak, A., Sanders, B., Predicting Flood Hazards in Systems with Multiple Flooding Mechanisms, AGU Fall Meeting, December 15-19, 2014, San Francisco, CA, USA
- ✧ **Cheng, L.**, Analysis of Non-stationary Spatio-Temporal Climatic Extremes, ESRL/PSD Seminar Series, June 4th, 2014, Boulder, CO, USA
- ✧ **Cheng, L.**, AghaKouchak, A., Gilleland, E., Katz, E., Nonstationary Extreme Value Analysis in a Changing Climate: A Software Package, AGU Fall Meeting, December 9-13, 2013, San Francisco, CA, USA (AGU OSPAs Awards)
- ✧ **Cheng, L.**, AghaKouchak, A., Deriving Climate Response from CMIP5 Ensemble Climate Projections: Application to Analysis of Temperature and Precipitation Extremes, AGU Fall Meeting, December 3-7, 2012, San Francisco, CA, USA
- ✧ AghaKouchak, A., **Cheng, L.**, Tracking and Nowcasting of Hurricanes: a Data Fusion Approach, 3rd World Meteorological Organization (WMO) International Symposium on Nowcasting (WSN12), 6-10 August 2012, Rio de Janeiro, Brazil